



## INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior  
National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)  
Exp. Date (11/30/2010)  
Form No. (10-226)

<b>Reporting Year:</b> 2010	<b>Park:</b> Shenandoah NP	<b>Select the type of permit this report addresses:</b> Scientific Study	
<b>Name of principal investigator or responsible official:</b> Melissa Roberts		<b>Office Phone:</b> 815-353-5610	
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<b>Additional investigators or key field assistants (first name, last name, office phone, office email)</b>			
<b>Name:</b> Jesus Maldonado		<b>Phone:</b> 202-633-4198	<b>Email:</b> Maldonadoj@si.edu
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<b>Name:</b> Lyndon Hawkins		<b>Phone:</b> 515-720-6303	<b>Email:</b> lr-hawkins@wiu.edu
<b>Project Title (maximum 300 characters):</b> Landscape genetic assessment of Virginia black bear ( <i>Ursus americanus</i> ) populations, and implications for management and conservation.			
<b>Park-assigned Study or Activity #:</b> SHEN-00378	<b>Park-assigned Permit #:</b> SHEN-2010-SCI-0011	<b>Permit Start Date:</b> Apr 15, 2010	<b>Permit Expiration Date:</b> Oct 31, 2010
<b>Scientific Study Starting Date:</b> Apr 15, 2010		<b>Estimated Scientific Study Ending Date:</b> Oct 31, 2010	
<b>For either a Scientific Study or a Science Education Activity, the status is:</b>  Suspended		<b>For a Scientific Study that is completed, please check each of the following that applies:</b>  <input type="checkbox"/> A final report has been provided to the park or will be provided to the park within the next two years  <input type="checkbox"/> Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park  <input type="checkbox"/> All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed	
<b>Activity Type:</b> Research			
<b>Subject/Discipline:</b> Mammals			

### Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

For this study, samples would be obtained from harvested specimens at hunter check stations as well as from noninvasive sampling techniques (fecal collection, hair snares). The principle investigator for this project is a Ph.D. candidate at George Mason University and has completed a Master's degree in Biology examining gene flow in the prairie ringneck snake (*Diadophis punctatus arnyi*) as well as research on the genetics of the Eurasian Tree Sparrow (*Passer montanus*).

This study would evaluate the amount of movement and gene flow in black bears within the state of Virginia. Urbanization has occurred over vast areas of Virginia and has created fragmented habitat for all of the native animals. Habitat fragmentation may affect large mobile animals like bears by limiting their dispersal and restricting gene flow. The west side of the state contains continuous forest habitat for a large number of bears, whereas the south-east corner of the state has a large density of bears in a restricted region around the Dismal Swamp National Wildlife Refuge and the north east corner contains Prince William National Forest, an area suspected to contain black bears. The area in between these refuges has occasional sightings of bears, but is mostly void of resident black bears. The obtained results can be applied to the state bear management plan as well as influence the amount of bears harvested each season through hunting. To date, no comprehensive analysis of genetic variability of bears in VA has been conducted. Determining the genetic structure of populations in this region will identify which populations are connected through gene flow and which are more isolated. Considering the limited number of genetic studies of bears, this proposed study can shed some important information on dispersal distances, adaptability and long term conservation requirements for the species. This information is also necessary for broad scale land-use planning to protect habitat meant to maintain or increase connectivity for healthy populations of bears and to identify areas where potential human-bear conflict may occur. Large scale phylogenetic work has been done primarily on subspecies in the western United States and Canada (Byun, Koop, and Reimchen 1997).

This project has potential to work with the Virginia Department of Game and Inland Fisheries as well as the National Park Service. Study of landscape genetics of large carnivores such as bears has great applied scientific value that can be used by protected area managers and policy makers, like identifying the geographical and anthropogenic barriers that may cause reduction in genetic diversity or hindrance in gene-flow. It can also be of great help in assessing the effect of various management alternatives on genetic variation of the populations. Another use of landscape genetics study is to assist in reserve design at landscape level by identifying a set of protected areas and delineating functional biological corridors in order to define evolutionarily significant management units (Schwartz et al. 2006).

All of the genetic analysis for this study will be conducted at the Smithsonian National Zoological Park's Center for Conservation and Evolutionary Genetics (CCEG) under the direct supervision of Dr. Jesus Maldonado. The CCEG is an ideal place to conduct the genetic portion of this study because Dr. Maldonado has extensive experience studying population genetics of endangered carnivores and is an expert in the use of non-invasive genetic techniques. For the past 8 years, Dr. Maldonado has been working to optimize these techniques to monitor populations of other endangered carnivores, such as the San Joaquin kit fox (*Vulpes macrotis*) (Smith et al. 2006) and the African Wild dog (Spiering et al. 2009). The lab facility at the CCEG has all of the equipment required for conducting this project, and the success record of this group is strong.

<b>Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):</b>	
The project was cancelled due to a lack of funding. No activity took place in 2010.	
<b>For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?</b>	
No	
<b>Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):</b>	<b>Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):</b>
\$0	\$0
<b>List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:</b>	

<p><b>Paperwork Reduction Act Statement:</b> A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.</p>
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